

ABSTRACT

Transition metal-substituted MCM-41 framework structures with a high degree of structural order and a narrow pore diameter distribution were reproducibly synthesized by a hydrothermal method using a surfactant and an anti-foaming agent. The pore size and the mesoporous volume depend linearly on the surfactant chain length. The transition metals, such as cobalt, are incorporated substitutionally and highly dispersed in the silica framework. Single wall carbon nanotubes with a narrow diameter distribution that correlates with the pore diameter of the catalytic framework structure were prepared by a Boudouard reaction. Nanostructures with a specified diameter or cross-sectional area can therefore be predictably prepared by selecting a suitable pore size of the framework structure.